

**Brookhaven National Laboratory  
Center for Functional Nanomaterials  
Implementation of the Secretarial Policy Statement  
On Nanoscale Safety (DOE P 456.1)**

The Center for Functional Nanomaterials (CFN) at the Brookhaven National Laboratory is one of five Department of Energy Nanoscale Science Research Centers (NSRCs) serving the growing scientific community focused on nanoscience. The CFN will facilitate major new directions in materials and chemical research programs and greatly expand the capabilities available to a national user base, thereby increasing interaction and support of university and industrial activities.

Department of Energy Policy P456.1 establishes the policy of the Secretary of Energy with respect to management of the potential environmental and health impacts resulting from research on nano scale materials. This policy commits the Department of Energy and the NSRCs to work together to better define the hazards of nanoscale materials and to develop a strong science-based environment, safety and health (ESH) program.

The following outlines the implementation of the DOE P456.1 for the Center for Functional Nanomaterials at the Brookhaven National Laboratory (BNL) operated by the Brookhaven Science Associates. This implementation plan is based on the principles delineated in the BNL Environmental, Safety, Security and Health (ESS&H) Policy which commits every employee, contractor and guest to continual improvement in environmental, safety, security and health performance for all activities performed at BNL.

**Adoption of Standards of Safe/Best Practice**

DOE Policy: *“DOE will adopt and implement, as appropriate, both existing and future environment, safety and health best practices, National Consensus Standards and guidance relating to nanotechnology developed by recognized standard-setting organizations. Further, any existing DOE Directives and Standards which contain provisions that are relevant to nanotechnology work must be appropriately applied”.*

- The BNL ISM program evaluates proposed work to determine which standards (regulatory and consensus) are most appropriate to minimize hazards associated with the work. Policies and procedures are identified, documented and deployed through the BNL Standards Based Management System (SBMS) and are adopted for use at BNL. These standards, when properly implemented, provide adequate assurance that the public, workers, and the environment are protected from adverse consequences.
- Currently there are no widely accepted consensus safety standards or regulations specific to nanoscale materials. BNL has been working with counterparts at the other NSRCs to identify common issues specific to nanoscale materials and develop a consensus approach to managing these issues. BNL has also developed an interim “Safe Handling Best Practices for Nanomaterials” based on best available knowledge.

- As national and international consensus standards become available they will be reviewed to determine their applicability to work at the site and implemented as appropriate through the SBMS process.
- Standards adopted by the DOE, or issued by the DOE via Directive, will be implemented in accordance with the ISM Program Description and SBMS procedures.

### **Identification and Management of EH&S Hazards**

DOE Policy: *“DOE and its contractors will identify and manage potential health and safety hazards and potential environmental impacts at sites through the use of the existing Integrated Safety Management System, including Environmental Management Systems.”*

- BNL will use its validated Integrated Safety Management (ISM), to address the hazards and risks of nanoscale materials and the DOE policy on Nanoscale Safety.
- Using the well-defined mechanisms described in the BNL ISM Program Description, the hazards of nanoscale research in the CFN will be evaluated, an appropriate set of controls will be identified and these safety controls will implemented in the workplace.
- Consistent with the BNL ISM Program Description, line management will be responsible for integrating ESH into work and for ensuring active communication and feedback up and down the management line and with the workforce.
- ISM at BNL is underpinned by it’s Environmental Management System (ISO 14001 registered) and it’s Occupational Health and Safety Management System (OHSAS 18001 registered) which drives the following
  - Establishment of goals for ESH
  - Measurement of progress against these goals
  - Conduct periodic Management Reviews
  - Communicate with stakeholders and neighbors to address any issues related to nanomaterial research including environmental, safety and health impacts.
- All proposed experimental work performed on nanoscale materials at the CFN or associated facilities will be reviewed using the BNL Experimental Safety Review (ESR) process, to identify the hazards associated with the proposed work and to establish the necessary set of ESH controls to allow the experimental work to be performed safely.
  - The ESR process will be managed by the CFN Department Experimental Review Coordinator.
  - Information required for a comprehensive ESH review will be collected when a proposal is made for work at the CFN using a screening process. This will include the materials and precursors to be brought to the CFN, equipment to

be used and handling of the nanoscale materials used and produced in the work.

- All ESR's will be reviewed by an appointed Experimental Safety Review Committee that will include Subject Matter Experts available from the Environment, Health Safety and Quality Directorate and appropriate Scientific Departments at BNL.
- All ESR's will be documented and periodically re-reviewed.
- All users will be required to review, understand and acknowledge the ESH requirements in the ESR prior to performing any experimental activities.
- No experimental work will be approved for the CFN or associated facilities until it is demonstrated that it can be done safely and within the envelope of safe operation approved for the facilities.
- Line management is held responsible for the authorization of work and for the implementation of the safety controls established during the ESR process.

### **Integration of New Research Findings Pertaining to Nanoscale Safety**

DOE Policy: *“DOE organizations working with nanomaterials will stay abreast of current research and guidance relating to the potential hazards and impacts of nanomaterials, and will ensure that the best current knowledge is reflected in the identification and control of these potential hazards and impacts at their facilities.”*

*“DOE will continue to both support research on the environmental and safety and health impacts of nanomaterials, and participate in government-wide activities aimed at identifying and resolving potential environmental, safety and health issues.”*

Nanoscale research requires an increased focus on specific ESH controls. Towards that end, BNL will remain current with DOE and other regulatory agency requirements to assure the latest information is applied and that controls are based on the most recent regulations, directives, guidance, best management practices, and/or toxicology information available

- The CFN will continue to participate in the NSRC ESH Working Group group composed of appropriate experts and individuals with expertise in environment, health and safety disciplines to advise CFN Management on the adoption and development of ESH best practices, lessons learned and policy pertaining to nanoscale research in the CFN.
- BNL will maintain the necessary qualified ESH support staff that is cognizant of the hazards and risks associated with nanomaterials.
- The CFN will work with our stakeholders to help them address their ESH needs and concerns. The CFN will maintain a positive proactive and constructive relationship with its neighbors in the community, regulators, DOE and other other stakeholders. The CFN will openly communicate with stakeholders on our progress and performance.